DOCUMENT RESUME

ED 204 789 CS 206 491

AUTHOR Spurgeon, Kristene C.
TITLE Teaching Graphics in Technical Communication Classes.
PUB DATE Mar 81
NOTE 18p.: Paper presented at the Annual Meeting of the Conference on College Composition and Communication (32nd, Dallas, TX, March 26-28, 1981).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Flow Charts; *Graphic Arts; Graphs; Higher Education; Illustrations; Tables (Data); *Teaching Methods; *Technical Writing; *Visual Aids; *Writing Exercises

ABSTRACT

Perhaps because the United States is undergoing a video revolution, perhaps because of its increasing sales of goods to non-English speaking markets where graphics can help explain the products, perhaps because of the decreasing communication skills of the work force, graphic aids are becoming more and more widely used and more and more important. Students in technical communication classes can become aware of graphics through illustrations found in annual reports of major companies, through multiple overlays on the overhead projector, and through graphic artists from the community. Students should become familiar with tables, line graphs, bar graphs, pie graphs, organization and flow charts, photographs, and drawings. Too, students should be encouraged to use graphics in their definition and process papers and in their major technical reports. In this way students can leave the class with an appreciation for the value of graphics and an understanding of how to adapt graphics to different audiences and different purposes and how to integrate them into the text. (Six technical writing assignments that call for the use of graphic aids are appended.) (HOD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED204789

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Kristene C. Spurgeon
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☒ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

Kristene C. Spurgeon
Southwest Missouri State University
Springfield, Missouri 65802

TEACHING GRAPHICS IN TECHNICAL COMMUNICATION CLASSES

Illustrations in books date back to fifteenth century woodcuts, and today's sophisticated variety of technical graphics grew out of a need to make relatively complex subjects easily understandable. World War II forced industry to build new, complex products; this created a need for technical illustrations to help train workers, and thus accelerated the growth of graphic illustration. Today the visual media is used for training and instruction in business and industry, government, and education. Graphic aids are used to convey and clarify information, to show trends and relationships--to bridge a communication gap, to enable nonspecialists to grasp specialized information. Perhaps because we are undergoing a video revolution, perhaps because of our increasing sales to non-English speaking markets where graphics can help explain the products, perhaps because of the decreasing communication skills of our work force, graphic aids are becoming more and more widely used and more and more important.

Because many technical communication teachers are recycled literature or composition teachers who are not trained to use or to teach the use of graphic aids, many are reluctant to do so and others are frustrated in their attempts. Yet it is difficult to find technical writing that does not use graphics; indeed, many types of statistical or complex data are difficult or even impossible to convey by words alone. Often this information can be conveyed much more efficiently and accurately by pictures, graphs, diagrams, tables, or other graphic aids.

We've all heard the now overworked cliché that a picture is worth a thousand words, but that's not always true. (I had that startling revelation a few years back when I assigned an 800-1000 word essay in my fresh-

CS206491

man composition class and one student showed up with a picture!) Sometimes it takes a lot of words to explain a picture--but something seen is often better understood and better remembered, more thought-provoking and more palatable.

Realizing the importance of graphic illustracions in technical communication, I set out to learn about them. I too have a background in literature but through a fortunate set of circumstances wound up teaching technical communication. In pursuit of literature degrees I of course wrote a lot of papers, but I never used graphics in them. So this was initially my weakest area in technical communication. I was a bit wary of and intimidated by anything new to me and by technology and the gadgets that go with it--afraid to try my hand at creating graphics (much less try to teach others how to use graphics), confident that the minute I tried something new and even semi-complicated in the classroom, Murphy's Law would immediately go into effect.

But, determined to become at least halfway proficient in this area, I began to note and study how others use visual aids--the kinds of information they present and its overall effectiveness for a particular audience and a particular purpose. I wrote to several major companies, asking for their annual reports--all chock-full of delightful graphic illustrations. (Perhaps because they assumed I was a potential stockholder, they were all very gracious about adding my name to their mailing lists--so now I'm under a constant barrage of annual reports.) Many of these illustrations are large enough to be used in a flip chart, and some of the smaller ones I've laminated so students can examine them in in-class graphics workshops. For my flip chart I purchased a very inexpensive ($4) artist's sketchpad, and I've found that this works as well as slides or other presentations

requiring more costly or complex equipment. The flip chart is simple and quick to produce, it requires no special lighting or equipment, it can easily be changed or added to, and it's economical. (Some of us who choose to live and work in the Ozarks get paid partly in scenery, so we have to cut all the corners we can.)

Another method that is almost as easy and inexpensive to prepare and use is overhead projection. The projector is simple to operate--even for nontechnical liberal arts folks--and can be used in normal lighting. I use multiple overlays to demonstrate different levels of effectiveness in graphic illustrations. I can face my students during the presentation; and I can write, draw, or point out items as I speak.

Still another profitable method of acquainting students with the use of graphics is to invite a specialist to class--someone from the school's technical illustration department (if it has one), or a graphic artist from the community. I've found that people with these skills are happy and proud to share them with others, and I think my students benefit from an informal question-answer session with an expert.

I certainly do not profess to be a graphics expert; I have not specialized in graphic illustration and I teach no courses in that subject. Nor do I profess to produce graphic artists. But in my technical communication classes I work with students from a variety of majors, many of whom will get no training in graphic illustration elsewhere. Because I believe graphic illustration is an important aspect of technical communication and also important to these future professionals, I try to at least make my students aware of the needs for and possibilities of visual aids--and when, where, why, and how to use them. I try to acquaint the students with the wide variety of graphic aids used today, but I stress the basics: tables,

line graphs, bar graphs and pie graphs, organization charts and flow charts, photographs, and drawings. I do not cover such topics as orthographic drawings, perspective illustrations, schematic diagrams, or axonometric illustrations--because I see no profit in spending time discussing methods of illustration for which neither I nor they have the equipment or expertise. Moreover, I believe those who will be expected in their careers to produce such illustrations will no doubt get training on the job or in graphics or technical illustration courses. (I do, however, provide sources for anyone who wants to tackle more complicated illustrations.)

I require my students to use graphics in their definition and process papers and in their major technical reports. I accept reproductions of others' illustrations, and I believe there's some value for the students even in this. But of course I'm more favorably impressed with the illustrations they design and produce. I realize that they have limited (if any) experience, and I understand their initial lack of confidence. Though most of them rely on a few basic illustrations (tables or simple graphs), I stress that there's little that's sacred about technical illustrations, and I urge them to be creative. I encourage them to try their hand at color, not only for its attractiveness but also because it has high memory value and promotes association. I introduce them to Chart Pak and Transfer Type, systems of rub-off lettering, and show them that even their fellow students and their totally unartistic teacher can produce professional-looking illustrations with the help of these systems. I'm pleased if they leave the class with an appreciation for the value of graphics and an understanding of how to adapt graphics to different audiences and different purposes, how to integrate them into the text, and a few general principles for their use.

Let's not be illiterates in a strange and unknown area, intimidated by technology and all that goes with it. Realizing the importance and increased use of graphic illustration, let's help prepare our students, our future professionals, to be better communicators--to be able to communicate with more than mere prose. If we do less, we do them a great disservice.

GRAPHIC AIDS

Introduction

Graphic aids are visual supplements to verbal presentations. They may be quantitative, emphasizing numerical values, or qualitative, emphasizing relationships. They are compact presentations of data that enable readers to visualize a great deal of information at a glance. Tables, graphs, charts, drawings, diagrams, photographs, and maps are examples of graphic aids.

Illustrations in books date back to fifteenth century woodcuts, and today's sophisticated variety of technical graphics grew out of a need to make relatively complex subjects easily understandable. World War II forced industry to build new, complex products; this created a need for technical illustrations to help train workers, and thus accelerated the growth of graphic illustration. Today visual media are used for training and instruction in business and industry, government, and education. Graphic aids are used to convey and clarify information, to show trends and relationships--to bridge a communication gap, to enable nonspecialists to grasp specialized information. Perhaps because we are undergoing a video revolution, perhaps because of our increasing sales to non-English speaking markets where graphics can help explain the products, perhaps because of the decreasing communication skills of our work force, graphic aids are becoming more and more widely used and more and more important.

General Principles

Sight is probably the most highly developed of our senses, and for most of us something seen can be better understood and more easily remembered. Graphic illustrations can often attract attention and provoke

thought much more readily than can pages of text. (See, for example, Figures 1 and 2 below.)

Figure 1.

Figure 2.

Also, we are a tv/comic book generation, and we are more likely to be interested in illustrations than in straight prose. Yet graphic aids must be functional, not just embellishment. And if they are to be effective and meaningful--or even palatable--they must be well designed and well placed.

Certainly a graphic aid should be chosen with a particular audience in mind. Whatever is most suitable for the audience and for the purpose of the presentation, whatever will communicate best, should be used. Graphics should not be cluttered with unnecessary information; nor should they be used indiscriminately, for they can distort, mislead, and confuse.

Formal tables require more white space and should be titled, numbered, and cross referenced. All columns must be labeled (in parallel grammatical form). Whole numbers are aligned by the right-hand digits, and others are aligned by the decimal points.

Tables I and II below illustrate two approaches to table-making; Table II obviously tries to embellish the statistics with a pictorial background.

Table I. Number of Persons by Age and Sex: 1970

Age	Male	Female
Total persons in U.S.	98,912,192	104,299,734
Under 5 years	8,745,499	8,408,838
5 to 14 years	20,759,233	19,986,482
15 to 24 years	17,551,116	17,890,253
25 to 44 years	23,448,593	24,546,641
45 to 64 years	19,992,043	21,317,726
65 to 74 years	5,437,084	6,998,372
75 years and over	2,978,624	4,651,422

Table II

MISSOURI DERAILMENTS 1979

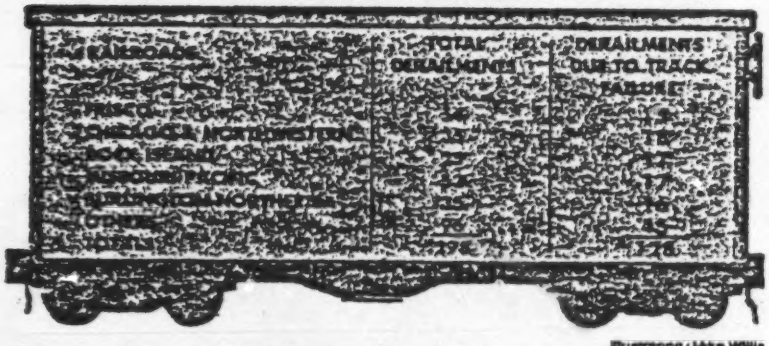


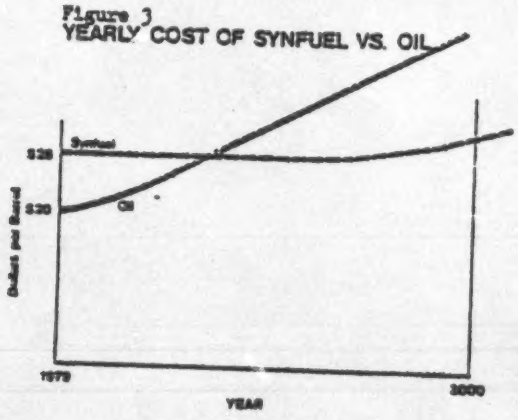
Illustration / Mike Willis

These figures for 1979 are provided by the Missouri Public Service Commission.

Graphs

Graphs present statistical quantities visually so that trends, changes, and cycles can be readily identified. They can be used to illustrate data that would require more time for study and analysis if it were presented in a table. Usually they are not as precise or accurate as a table, but they can make a point more strikingly (see Figure 3).

Figure 3
YEARLY COST OF SYNFUEL VS. OIL



Though they deal with numerical quantities, graphs emphasize change rather than amount. (Sometimes the terms "graphs" and "charts" are used interchangeably. In this guide they are used interchangeably except "chart" is also used to describe visual aids that deal with non-statistical information, such as the organization chart and the flow chart.)

Graphs have horizontal scales (usually for plotting independent variables) and vertical scales (usually for plotting dependent variables). Each scale must be labeled, of course, as must any symbol used in the graph.

Line graphs use one or more lines to depict changes in the value of a variable quantity (or quantities). (See Figures 4 and 5.) They visually dramatize trends, amounts, and results over a period of time; they are good

for comparing series and are most commonly used to present data corresponding to consecutive time periods. (See Figures 6 and 7.)

Figure 4.

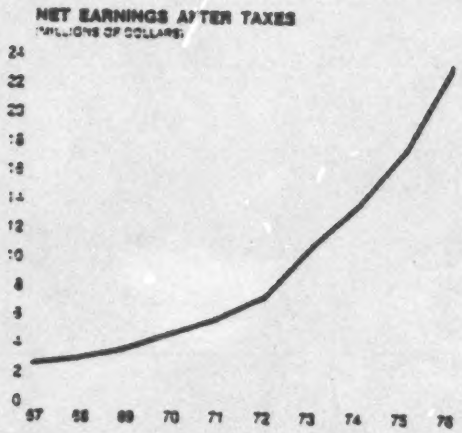
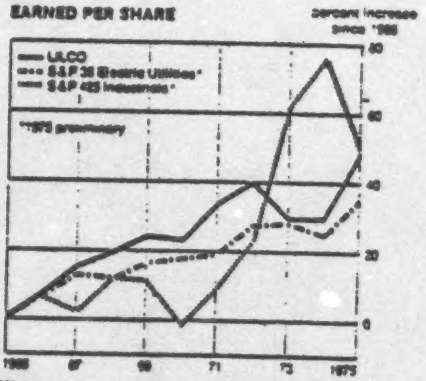


Figure 5.



The 48% increase in LILCO's earnings per share since 1965 has been greater than that of the Standard and Poor's electric utility average and almost equal to that of the industrial average.

Figure 6.

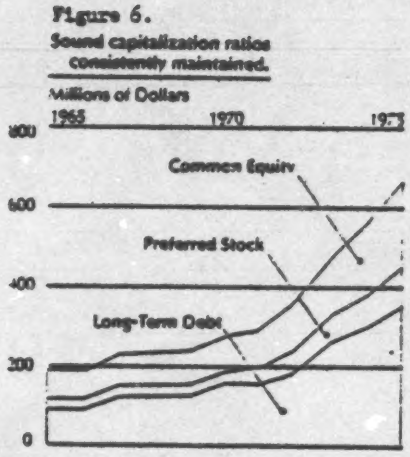
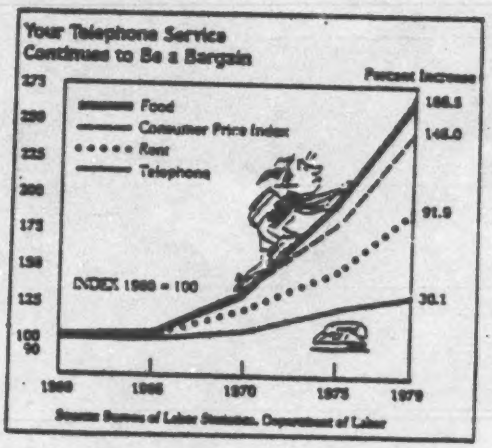
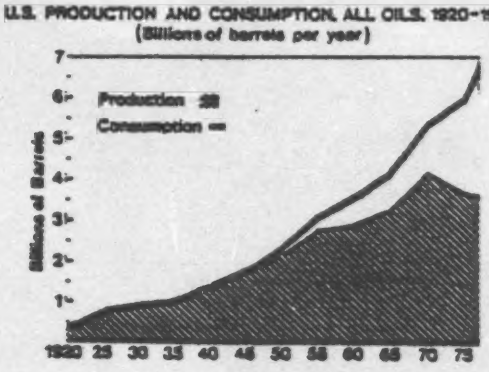


Figure 7.



When the lines of a graph depict a continuous natural process, they may be smoothed or "faired"; otherwise, lines are drawn from point to point. When a series of lines are used the layers they create can be filled in with different colors or shading patterns; this is called a layer graph (also called a surface or strata graph). (See Figure 8.)

Figure 7.


U.S. PRODUCTION AND CONSUMPTION, ALL OILS, 1920-1977
(Billions of barrels per year)
Production
Consumption
Billions of Barrels
1920 25 30 35 40 45 50 55 60 65 70 75

Bar graphs, rectangular blocks of color or shading on a simple grid, are perhaps the simplest type of visual aid to prepare and to understand. They provide striking comparisons between a limited number of items. They may be drawn either horizontally or vertically; usually vertical bar graphs (also called column graphs) show the amount or size of one item at different periods of time (see Figures 9 and 10), whereas horizontal bar graphs show different amounts of more than one item at the same time (see

Figure 9

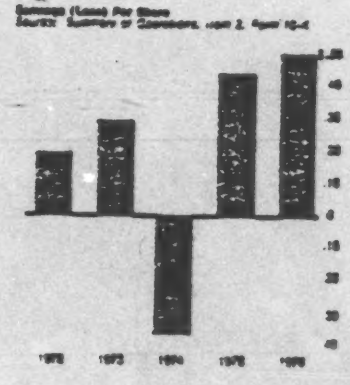


Figure 10.

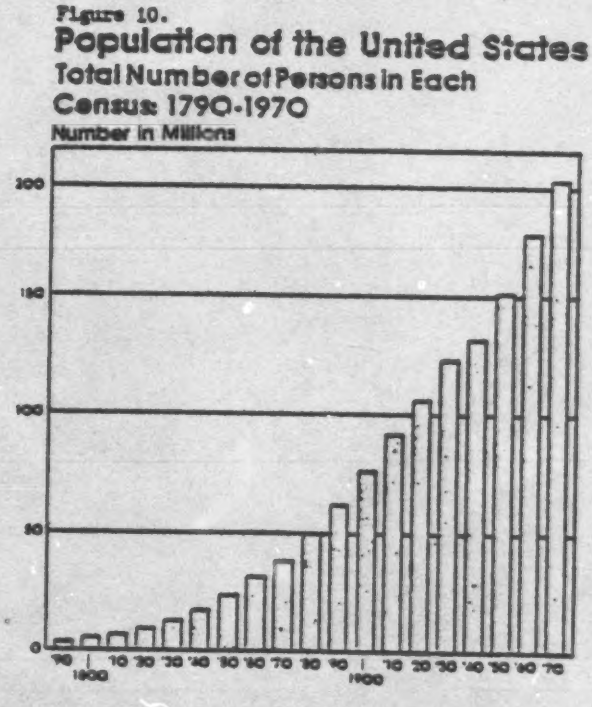


Figure 11). Sometimes a combination line-bar graph is used to compare two or more variables (see Figure 12).

Figure 11.
Number of Persons by Age and Sex: 1970
Number in Millions

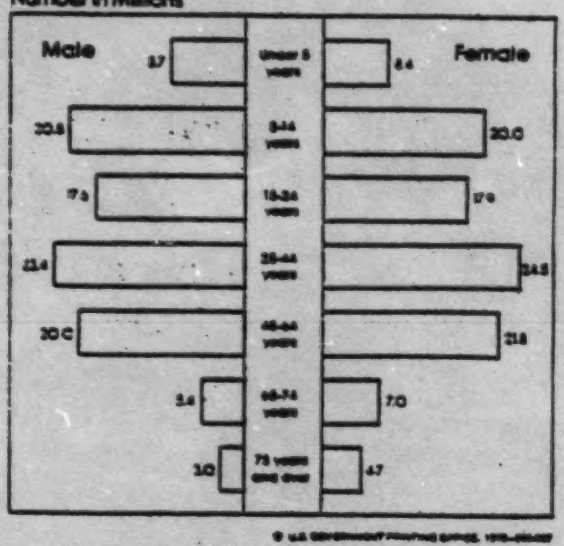
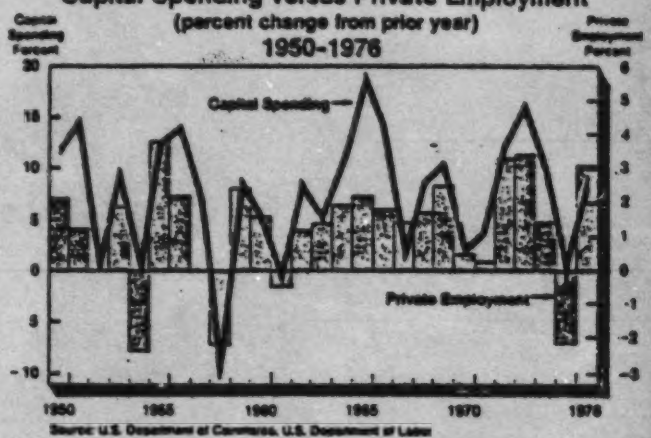
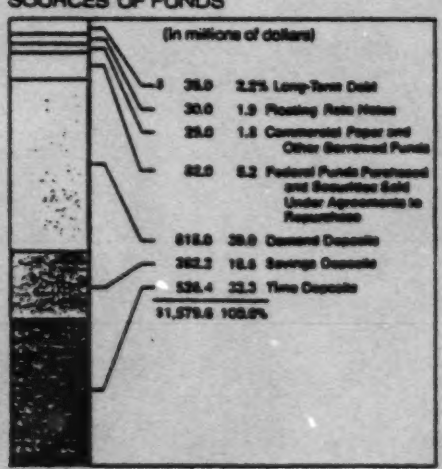


Figure 12.
Capital Spending versus Private Employment
(percent change from prior year)
1950-1976



In addition to the multiple bar charts just discussed, a subdivided bar graph (also called 100% bar graph) can be used to depict the relative size or percentage of each of the parts of a whole (see Figure 13). Segments can be differentiated from each other by colors, shading, or texturing.

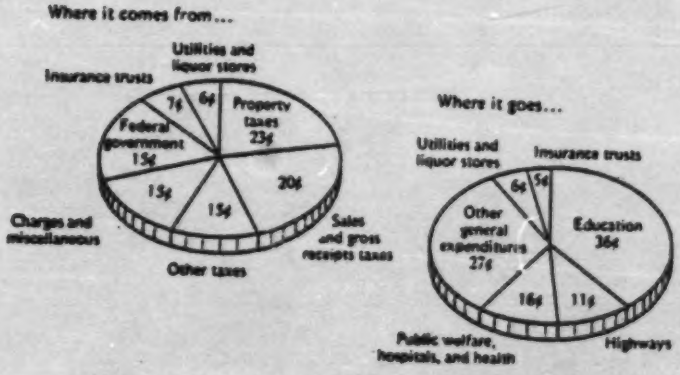
Figure 13.
SOURCES OF FUNDS



Pie graphs (also called circle or sector graphs) vividly depict divisions of a whole into its component parts. The circumference of the circle represents 100%, and it is divided into segments (or slices) representing proportions or percentages of the whole. The pie is first sliced at the 12:00 o'clock position, and moving clockwise the slices are cut in order of descending size. (See Figure 14.)

Figure 14.

The state and local government dollar, 1970. (U.S. Bureau of the Census)



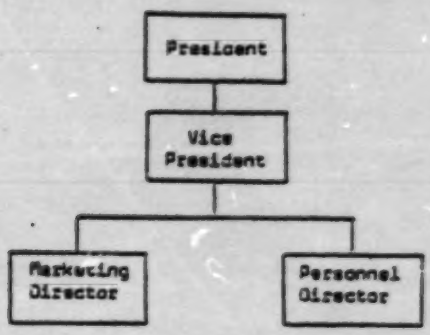
Pie graphs are perhaps not the most accurate way to present data, but they make it easy to compare parts to each other and to the whole. And they have a strong visual impact, a dramatic emphasis. They are most effective when there are few divisions and a wide range of proportions. Generally there should not be more than six or eight sections; very small percentages probably show up more vividly in a bar graph.

Charts

As noted earlier, graphs can also be called charts, but here the word "chart" takes on an additional meaning and refers to graphic aids depicting non-statistical information.

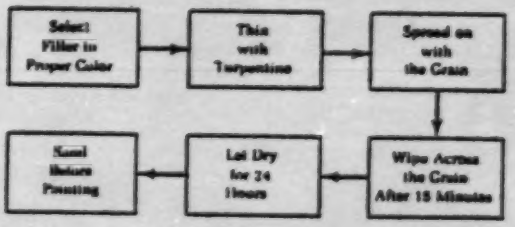
Organization charts present not statistical data but rather the distribution of functions, personnel, and authority within an organization. They are an excellent way to show lines of authority and levels of responsibility. The organization chart below depicts one company's executive hierarchy.

Figure 15. Executive Hierarchy



Flow charts depict various steps of a process or the flow of a product from beginning to completion, as can be seen below. The steps are represented by geometrical figures or by drawings suggesting their actual appearance.

Figure 16. Preparing Wood for Painting


Select Filler in Proper Color
Thin with Turpentine
Spread on with the Grain
Wipe Across the Grain After 15 Minutes
Let Dry for 24 Hours
Sand Before Painting

Photographs

Photographs provide realism and authenticity; in technical writing they are used not only to assist verbal description but also to prove the truth of assertions (see Figure 17). Photographs are limited, however: they can show only the surface, and sometimes they unavoidably present in-

significant facts. Also, they are often difficult and costly to reproduce.

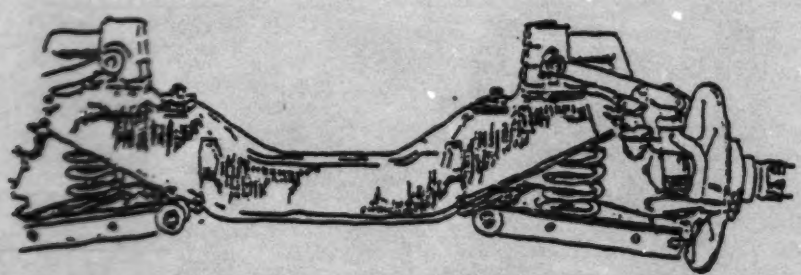
Figure 17.

Explosive growth. The cross section below is from a 27-year-old Southern pine in an unmanaged forest. On the left, a tree of the same age in a managed forest, producing over 3 times the wood fiber per acre.

Drawings

Drawings are often fairly complex and require some skill to produce. This does not mean, however, that amateurs can't put them to good use; note the neat illustration below, drawn by a student. Drawings are often the best method of picturing the relative shape and location of objects, and they have two advantages over photographs: they can picture the interior as well as the exterior of an object, and they can omit the insignificant and emphasize the significant.

Figure 18. Front End from a 1965 Chevrolet Corvair.



Assignments

● 1. (From journals, reports, brochures, etc.) collect and bring to class samples of graphic aids, along with their captions and supporting text. Be prepared to discuss their effectiveness.

● 2. Convert the following information into a table.
Texas County, Missouri, experienced a drought in 1980. In January it received only .32 inches of rainfall, compared to the normal 2.66 inches. February, however, supplied 2.84 inches, more than the normally received 2.25 inches. March was another exception, providing 4.63 inches, whereas the normal March rainfall is only 4.24 inches. But in April the norm is 4.27 inches, and the county received only 2.49 inches; and the May average is 3.97 inches but Texas County received only 2.56 inches. The trend continued in June: Texas County registered only 2.05 inches of moisture, as opposed to the normal 4.58 inches. And again in July: only .68 inches for Texas Countians, compared to the usual 4.14 inches. August and September continued the trend--1.12 and 2.10 inches, respectively, instead of the normal 3.68 and 4.16. In October, however, the county received more rainfall than usual: 3.98 inches rather than 2.74 inches. But November and December reversed that short-lived trend, providing only 1.92 and .64 inches in lieu of the normal 2.53 and 2.25 inches, respectively. Thus the county suffered one of the worst dry spells in its history, receiving a total of 25.33 inches of rainfall, 16.14 inches short of the normal 41.47 inches.

● 3. Draw an organization chart depicting the following information: Southwest Missouri State University is under the general control and management of its Board of Regents. The President is the chief executive of the University, responsible to the Board of Regents. The Dean of Faculties, the major academic officer of the University, serves under the president; and five deans are responsible to him--the Dean of Arts and Humanities, the Dean of Business, the Dean of Education and Psychology, the Dean of Science and Technology, and the Dean of the Graduate School. Department heads are responsible to the deans; for example, the Head of the English Department is responsible to the Dean of Arts and Humanities--and then the English Department faculty are responsible to the department head.

● 4. Construct a line graph that presents the following information: Our university has grown from 400 students in 1909 to 14,350 students in 1979. This is how the growth pattern can be traced: 500 students were here in 1919, 1048 students were here in 1929, and 1615 students were here in 1939. In 1949 the headcount was 1877, in 1959 it was 2711, and in 1969 it was 8192.

● 5. Fifty people took Technical Writing last semester. Of these, 10 received A's, 20 received B's, 15 received C's, and 5 received D's.
Draw a circle graph showing the percentage of students receiving each grade. Then draw a divided bar chart depicting the same information.

● 6. Both our library and our placement office have copies of the Occupational Outlook Handbook, which is published by the U.S. Department of Labor. Consult this book for trends and outlooks in your major field, and then construct an appropriate graphic aid which presents this information.

Graphic Communication: A Selected Bibliography

Enrick, Norbert Lloyd. Effective Graphic Communication. Princeton: Auerbach, 1972.

Thorough, non-technical discussion of how to create and use many types of charts and tables.

Magnan, George A. Using Technical Art: An Industry Guide. New York: Wiley-Interscience, 1970.

An overview of graphics in American industry that explains when, why, and how to use them. Discusses drawings, diagrams, charts, graphs, photographs, slides, posters, filmstrips, and transparencies; and includes a list of advantages and disadvantages for each.

Murgio, Matthew P. Communications Graphics. New York: Van Nostrand Reinhold, 1969.

Chapters on types of charts and graphs and how to draw them, using color in graphic aids, and planning and making presentations with graphic aids (including a chapter on presentations using projected material).

Pocket Pal: A Graphic Arts Digest. 12th ed. New York: International Paper Company, 1979.

Graphic arts handbook that discusses printing: history, typefaces, composition, paper, inks, plate making. Has one chapter on graphic arts photography and a glossary of graphic arts terms.

Turnbull, Arthur T., and Russell N. Baird. The Graphics of Communication: Typography, Layout, Design. 3rd ed. New York: Holt, Rinehart and Winston, 1975.

Basic introduction to graphics and communication tyeory. Chapters on graphic illustration (photography and charts), typography, printing processes, and aspects of layout and design (contrast, balance, proportion, rhythm, grouping).

(Also, most technical communication textbooks contain useful chapters on the use of graphic aids.)